Title: Apparatus For Spindle Bearing Friction Estimation For Reliable Disk Drive Startup

Docket No.: PANA-01066US2 Inventor: Brian Tanner
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Herewith

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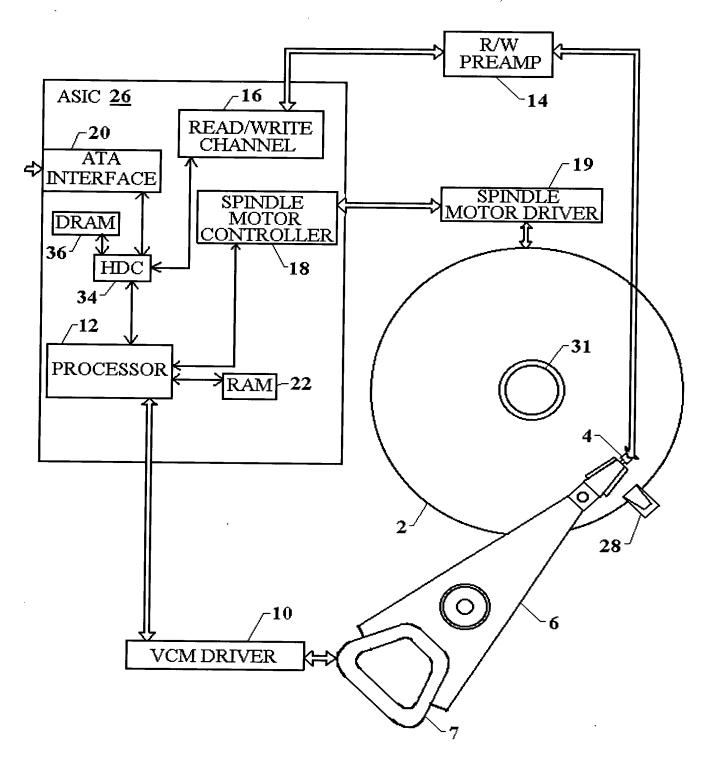


FIG. 1

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Drive Startup

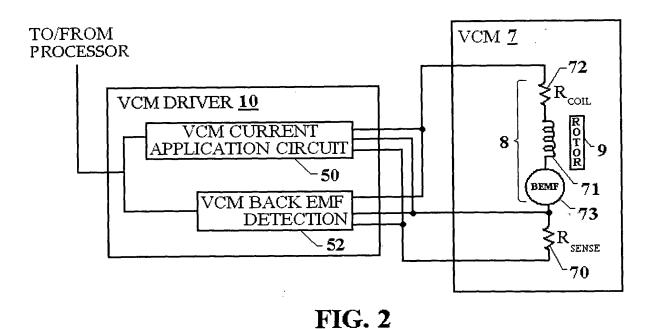
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TO/FROM SPINDLE MOTOR CONTROLLER 18 SPINDLE MOTOR DRIVER 19 <u>30</u> 31 COMMUTATION 68 VOLTAGE/TIMING 65 63 APPLICATION CIRCUIT 40 SPINDLE MOTOR 64 **BACK EMF DETECTION** 42

FIG. 3